(12) UK Patent Application (19) GB (11) 2 121 390 A

(21) Application No **8216330**
(22) Date of filing **4 Jun 1982**
(43) Application published **21 Dec 1983**
(51) **INT CL³ B67B 3/20**
(52) Domestic classification **B8T** 604 82A 82D2 82D7 SBC
(56) Documents cited **GB A 2040892**
GB 1111233
GB 0727293
(58) Field of search **B8T**
(71) Applicant **Metal Closures Limited, (United Kingdom), Bromford Lane, West Bromwich, West Midlands, B70 7HY**
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(54) **Applying pre-threaded closure caps**

(57) In feeding internally pre-threaded closure caps 2 from a feed chute 1 to a line of externally threaded bottles or the like 3 en route to a cap-tightening apparatus, the caps pass under a hold-down plate 4, where each cap is first subjected to a limited contra-rotation by engagement with a friction plate 5 to level the cap thread on the bottle thread and is then subjected to a limited forward rotation by a second friction plate 6. The friction plates are preferably pivoted (14, Fig. 2) towards their leading ends and are free to turn through a limited angle to allow them to be spring-biased to engage the passing caps. Plate 6 may be replaced by a disc driven by a limited torque motor and the rotations applied to the cap may occur whilst the associated container is moving along an arcuate path (Fig. 2).

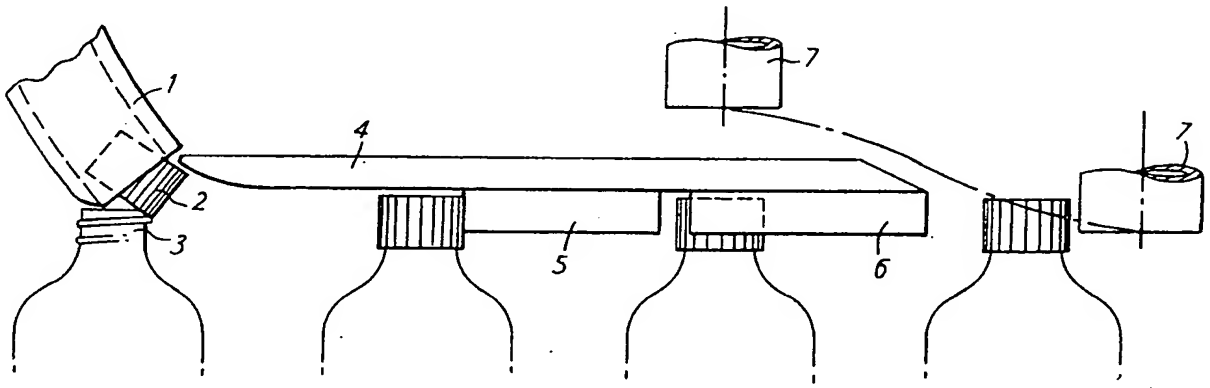

FIG. 1

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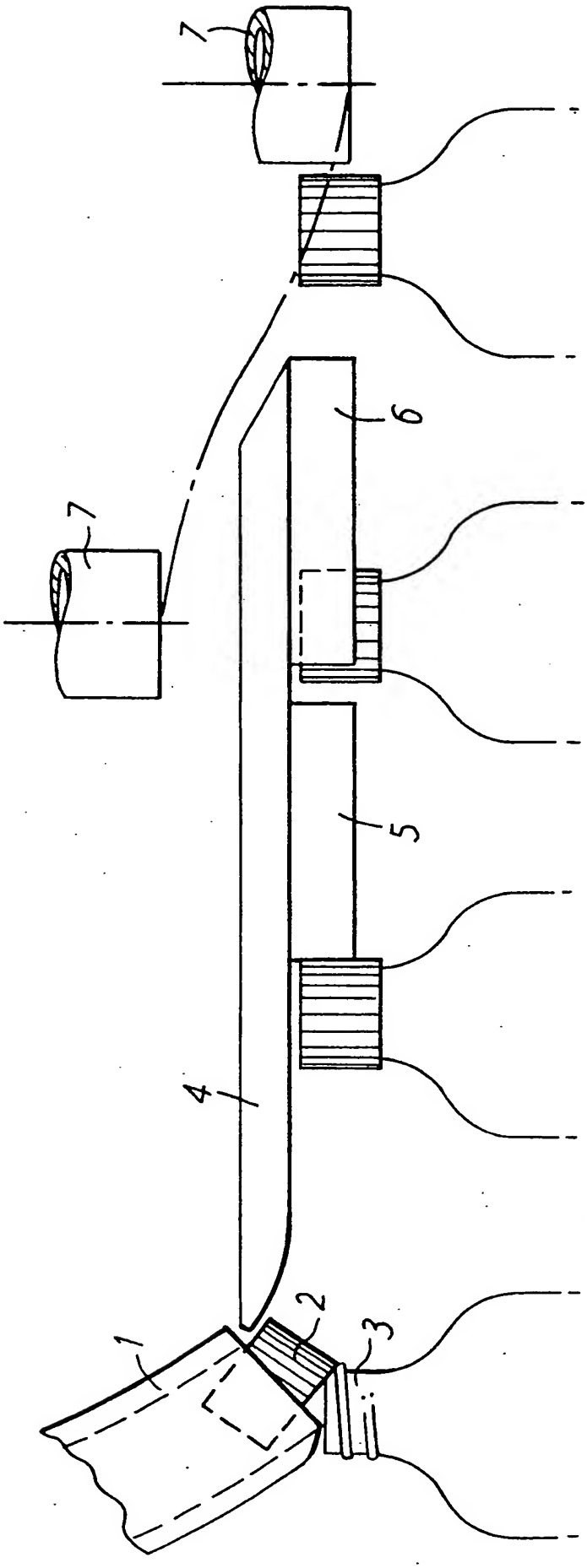

FIG.1

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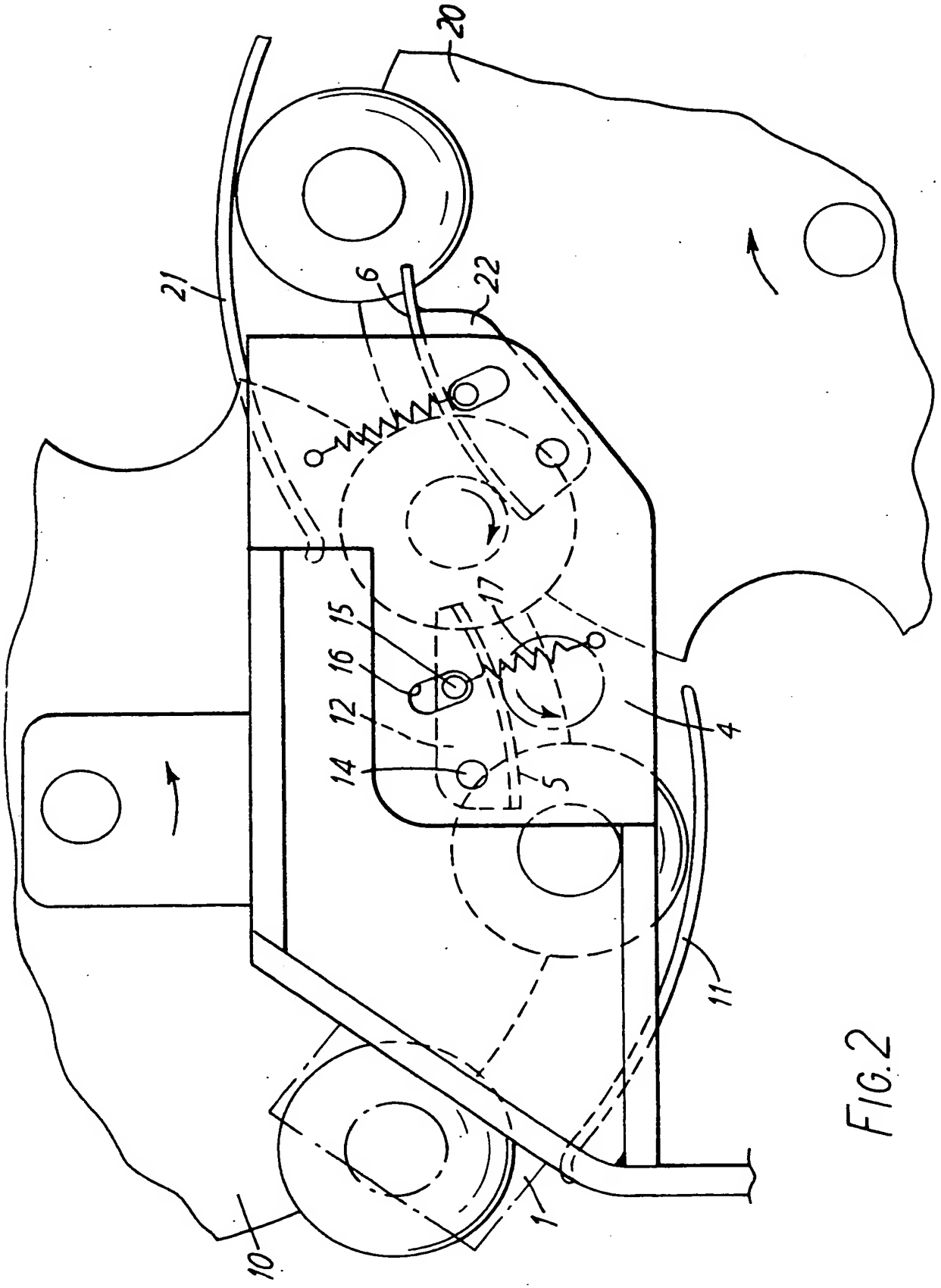

FIG.2

SPECIFICATION

Improvements in feed mechanisms for capping machines for containers

The present invention relates to the application of closure caps to containers having externally screw-threaded necks.

In the application of unthreaded metal closures to such containers a cup-shaped blank is picked up by the bottle as it passes a feed chute.

In the existing procedure for feeding unthreaded metal or threaded plastic closure blanks the containers are travelling continuously or by indexed steps when passing under the feed chute. The containers may be moving in an arcuate path in a star wheel or may be travelling on a linearly moving conveyor.

The leading blank in the feed chute projects from the feed end of the chute and the chute is somewhat inclined to the direction in which the containers travel so that the top end of the bottle neck just strikes the inside of the closure blank skirt and draws the blank out of the chute, while passing under a hold-down plate which is progressively curved to an essentially horizontal position beyond the exit end of the chute. That arrangement works satisfactorily for feeding unthreaded blanks, since the internal diameter of the closure skirt is greater than the diameter of the bottle neck over the threads.

When this system is employed for feeding internally pre-threaded closures, such as moulded plastic closures, considerable inconvenience is experienced by reason of the tendency of the closure to assume a tilted position on the container thread. Such tendency is the result of a mismatch of the closure thread and the container thread, when the closure is drawn out from the feed chute. Difficulty is then experienced when the container and closure is forwarded to the spinning head, employed to tighten down the cap on the container thread. In current installations this can result in jamming of caps; it is then found necessary to stop the machinery to free such caps on the containers.

It is an object of the present invention to provide a cap feed for pre-threaded caps which can run substantially unattended and with a much reduced risk of jamming.

We have now found that the problem of tilted caps is almost wholly overcome by turning the cap through a a limited angle in the contra direction to the direction for screwing down the cap so as to level the cap thread with the container thread while the cap is under the hold-down plate after complete withdrawal from the chute, the cap then being turned in the opposite direction to engage the cap thread with the container thread.

The rotation of the cap in either direction is conveniently effected by moving the bottle, bearing the cap, past a friction member located on one side of the path of the cap and positioned to frictionally engage it for applying rotation in the appropriate direction. Each friction member is preferably mounted on a pivoted arm, which is mounted on a vertical pivot at its leading end and is spring loaded, so that its trailing end is held against a stop so as to protrude slightly into the cap path and thus ensure frictional engagement with the cap as it is moved past it on the bottle. To level the cap thread with the container thread it is desirable to impart a reverse rotation of the cap slightly in excess of 360°. The subsequent rotation of the cap in the forward direction is not critical, but it is preferred that such forward rotation for pre-tightening the cap should be no more than about 360°. During both reverse and forward rotation of the cap the bottle is preferably securely guided to prevent it being laterally tipped to any substantial extent away from the friction member. The forward rotation is preferably commenced immediately the cap is released from the reverse-rotation friction member, particularly for the purpose of economising on machine space.

The reverse rotation and forward rotation of the cap may be carried out while the bottle is travelling in a straight line on a conveyor or while travelling in an arcuate path, driven by a conventional star wheel. In many machines bottles are fed by means of an input star wheel to a second star wheel which travels in slip with a turret carrying a spinning head, axially aligned with each star wheel pocket, for tightening down the cap of the bottle in the respective star wheel pocket.

In this type of arrangement the reverse-turn friction element may act on the caps of the bottles as they travel through the input star wheel and the forward-turn friction element acts on the cap as the bottle enters the second star. In such arrangement the pivoted arms, which preferably carry the friction elements, are reversely curved in relation to one another.

Where the forward-direction friction element co-operates with a star wheel, having co-acting spinning elements carried by a turret, the turret is arranged to lift the spinning heads of the friction element and associated parts and to bring down the spinning elements successively to tighten the prescrewed caps as they emerge from under the hold down element and clear the end of the friction element. It will be appreciated that one friction element can operate on the cap while the bottle is travelling in a straight line, while the other friction element acts on the cap while the bottle is travelling in a curved path.

In the accompanying drawings.

Figure 1 illustrates the principles of one form of apparatus for performing the present inention, and

Figure 2 is a semi-diagrammatic top view of the apparatus.

As will be seen from Figure 1, at a cap feed station pre-threaded caps, (which may be formed of plastic or metal) are fed successively down a curved chute 1 of conventional construction, in which the leading cap 2 projects from the chute as indicated to be picked up by the neck 3 of a

bottle. The bottles then pass successively beneath a fixed hold down plate 4, which conforms to the path of the bottles. The clearance between the hold down plate and the top of the cap is carefully controlled to hold the cap in a levelled position, when that has been achieved. The caps 2, assuming them and the bottles to be of conventional right-hand thread configuration, first come into contact with a friction element 5 arranged to be left of the bottle (as seen from the direction of bottle travel) to apply a contra rotation to the cap. The length of the friction element 5 is related to the circumference of the cap 2 so as to impart about 250° rotation in the reverse (unscrewed) direction to the cap and thus level the cap in relation to threads on the bottle neck by disengaging any mismatching of the cap threads and bottle threads. The bottle and cap are then carried past a second friction element 6, lying to the right of the path of the bottle and cap and this imparts a rotation of the cap in the tightening direction to pre-screw the cap (without full tightening). The friction element 6 has a length about equal to 80% of the cap circumference to apply rather less than one turn to the cap. After clearing the end of friction element 6 the spinning head 7, which travels with the cap and bottle at this step, is progressively lowered to tighten the cap down onto the bottle in a conventional manner.

In Figure 2 it will be seen that bottles pick up their caps from the chute 1 as they enter an inlet star wheel 10, against which they are held by a rail 11. The star wheel 10 carries the bottles under plate 4, to which a friction arm 12 is pivotally attached at 14. The friction arm 12 carries a pin 15 in a slot 16 in the plate 4. The friction arm 12 has a curvature corresponding substantially with the path of the left hand side of the caps on the bottles, and is biased to the right by a light tension spring 17. The friction arm is free to move within the limits permitted by slot 16.

By the time the cap clears the end of friction arm 12 it has been reverse rotated through approximately 360° and is levelled on the bottle thread. The bottle is then transferred from the inlet star wheel 10 to the star wheel 20 which rotates coaxially and synchronously with a turret head, carrying vertically movable spinning heads arranged coaxially with each bottle-receiving pocket in the periphery of the star wheel. The bottle is held against star wheel 20 by a rail 21 and the cap is now rotated in the tightening direction by a contact with a friction arm 22 which is constructed and operates in the same manner as the friction arm 12, except that it contacts the right-hand side of the cap to turn it in the tightening direction.

It is the reverse rotation applied by the friction element 11 which is the essence of the present invention. In some instances, particularly where the prescrewing operation is carried out on a rectilinear conveyor, it may be desirable to replce the second friction arm by a rotating disc, driven by a limited torque, vane type air motor, as described in our co-pending Patent Application No. 82.10096.

In most instances the undersurfce of the plate 4 is arranged at such a position that at the forward end of the plate a cocked cap (in which the start of the cap thread is immediately above the start of the bottle thread so that there is maximum mismatch between the two sets of thread) can just pass under said plate. there is preferably a change at the outgoing end of the friction element 5 and the undersurface of the plate is lowered to a position at which a properly levelled cap can just pass beneath it.

Claims (Filed on 2.6.83)

1. An apparatus for feeding internally threaded closure caps to bottles or like containers, having an externally threded neck, comprising a feed chute, adapted to locate a closure cap in a position which is inclined in relation to the path of containers in passage to a cap-tightening apparatus, the cap in the feed chute being held in a position such that it is drawn out of the feed chute by a passing container, a hold down means being located to co-operate with the feed chute and hold down the withdrawn closure cap against the mouth of the container, a first cap-rotating means co-operating with the hold-down means for rotating the held-down cap through a limited angle in a direction contra to the tightening direction, a second cap-rotating means co-operating with the hold-down means for subsequently rotating the cap in the tightening direction.

2. An apparatus according to claim 1 in which the first cap-rotating means comprises a friction plate positioned to frictionally engage the cap carried on a passing container.

3. An apparatus according to claim 2 in which the second cap-rotating means comprises a second friction plate positioned to frictionally engage said cap at a point on the opposite side of the path of the closure in relation to the point of contact with the first friction plate and thereby rotate said cap in the cap-tightening direction.

4. An apparatus according to claim 3 in which the second cap-rotating means is adapted to rotate the cap through no more than about 360°.

5. An apparatus according to claim 1 or 2 in which the second cap-rotating means comprises a rotating disc for engaging the peripheral surface of said cap, said rotating disc being driven by a limited-torque motor.

6. An apparatus according to any preceding claim in which the first cap rotating means acts on the cap while the continer is progressed in an arcuate path by a first star wheel carrier and the second cap-rotating means acts on the cap while the container is progressed by a second start wheel carrier, rotating in the opposite direction to the first star wheel carrier.

7. An apparatus according to claim 2 or 3 in which at least one of said friction plates is mounted on a pivot located near the leading end

of said plate and is provided with a pin, located towards the tail end of such plate for engagement with a slot in a fixed member to permit limited arcuate movement of said plate, said plate being biased in a cap-engaging direction by spring means.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1983. Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 03 25 7586

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X A	DD 288 815 A (FORSCH RATIONALISIERUNG LACKE) 11 April 1991 (1991-04-11) * page 2 *	1,4-6, 8-11 23	B67B3/20
X A	EP 0 618 168 A (GEI FILLING CAPPING & LABELLIN) 5 October 1994 (1994-10-05) * claim 1 *	1,4-6, 8-11 23	
X	EP 1 249 426 A (SHIBUYA KOGYO CO LTD) 16 October 2002 (2002-10-16) * column 7, line 24 - line 26 *	1,8	
X	EP 1 132 331 A (SHIBUYA KOGYO CO LTD) 12 September 2001 (2001-09-12) * column 8, line 3 - line 6 *	1,8	
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X	GB 2 121 390 A (METAL CLOSURES LTD) 21 December 1983 (1983-12-21) * abstract *	1,8	TECHNICAL FIELDS SEARCHED (Int.Cl.7) B67B
A	US 6 158 196 A (CAVINA LUIGI ET AL) 12 December 2000 (2000-12-12) * abstract *	23	

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	10 March 2004	Martínez Navarro, A.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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EPO FORM 1503 03.82 (P04C01)